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Project 86029.00
29 August 2017
86029.00.R.002.Rev0
DIH:jlb

Attention: Joelle Sarkis

Email: jsarkis@conradgargett.com.au

Dear Sirs

Contamination Assessment and Preliminary Waste Classification
DoEAMD-16-78 Group 2 - Parramatta Region
Auburn North Public School, 100 Adderley Street, Auburn

1. Introduction

This letter report presents the results of a contamination assessment and preliminary waste classification carried out in the areas of the proposed new school buildings to be constructed within the grounds of Auburn North Public School at 100 Adderley Street, Auburn. These investigation areas are shown on Drawing 1, attached. The work was requested by Conrad Gargett Pty Ltd, architects for the project, as part of the NSW Department of Education school upgrading program DoEAMD-16-78 Group 2 – Parramatta Regions.

The proposed two new buildings located in the north-eastern area of the school comprise the following:

- A new single storey administration building as an extension to the existing building; and
- A separate building with two levels of enclosed learning areas and a lower ground floor storage area is proposed. This building comprises two 'wings', with the open area between these wings to be covered by a concrete slab.

Site investigations were initially undertaken by Douglas Partners Pty Ltd (DP) primarily for geotechnical purposes with contamination sampling undertaken from the geotechnical boreholes to provide preliminary information on waste classification of soils to assist project planning.[1] The results of the foresaid intrusive investigations have been supplemented by a review of the proposed development and readily available information on the school's history for this report.

[1] Douglas Partners Pty Ltd, *'Geotechnical Investigation ad Preliminary Waste Classification, DoEAMD – 16-78 Group 2 – Parramatta Region, 100 Adderley Street, Auburn'*, ref: 86029.00.R.001, 9 August 2017

It is noted that intrusive sampling and laboratory analysis provides data which is more reflective of actual site conditions as opposed to a qualitative risk assessment based on desktop information. Given this and that the investigation areas are within the existing school grounds and hence a change in landuse is not proposed, the works discussed herein are considered a suitable approach for reviewing the risk of contamination within the footprints of the new buildings.

It is noted that this report is not a contamination review for the whole school site and is limited to the investigation areas.

2. Site Description

The proposed administration building is located within part of the Auburn North Public School grounds known as Part Lot 1 in DP 782325. It is a rectangular shape some 20 m by 10 m in maximum plan dimensions with the approximate footprint shown on Drawing 1 attached. It is bounded on all sides by pathways, garden beds and existing school buildings. At the time of the investigation the site was occupied by pavements and garden beds with small trees. It is near flat at RL 25.5 m relative to the Australian Height Datum (AHD).

The proposed new two levels of enclose learning areas and lower ground storage area within part of the grounds known as Part Lot 1 in DP 782325, Part Lot 416 in DP 821067 and Part Lots 11, 12, 13, 14 in DP 9688. It is a rectangular shape some 50 m by 20 m in maximum plan dimensions. It is bounded to the north, south and east by grassed playing areas and the west by pavements and school buildings. At the time of the investigation, the site was occupied mostly a grassed sloping area probably cut to form a level cricket ground. Site surface levels initially grade significantly from the north west to south east from the school buildings at RL 24.5 m down to the near flat cricket ground at RL 20.5 m which in turn slopes slightly to the south east. Several mature trees are located within the proposed building footprint and adjacent to it.

3. Regional Geology

Reference to the 1:100 000 Sydney Geological Sheet indicates that the school (the “site”) is underlain by Middle Triassic aged Ashfield Shale of the Wianamatta Group. It typically comprises black to dark-grey shale and laminite.

Shale and laminite were encountered in most of the boreholes meaning the site conditions are consistent with Ashfield Shale beneath the site.

Reference to the 2002 Map of Salinity Potential in Western Sydney indicates the site is in an area of no known salinity but may have moderate salinity potential.

4. Additional Desktop Information

A review of the Auburn North Public School website indicates that the school was opened on 12 January 1891.[2] The 1943 aerial photograph (refer to Drawing 2, attached) is consistent with the site's continued use as a school, with several buildings on the site, although these building do not appear to occupy the investigation areas. The landuse in the surrounding properties shown in the 1943 photograph is primarily low density residential with some commercial/industrial development to the west apparent.

Additionally, a search of the NSW EPA website was undertaken by DP on 28 August 2017 to review the potential presence of properties in the area that:

- Have been recorded by NSW EPA as a contaminated site under section 58 of the *Contaminated Land Management Act* 1997 (CLM Act); and/or
- Are subject to a NSW EPA environmental protection licenses (EPL) issued under section 308 of the *Protection of the Environment Operations Act* 1997 (POEO Act).

The search did not record any properties within 500 m of the school regarding the above.

Site structures are reported to contain asbestos materials, as indicated in the school's asbestos register,[3] although asbestos in soils has not been reported. Given this, DP understands that the school is not subject to a site specific management plan but is subject to the NSW Education Department's *'Asbestos Management Plan for NSW Government Schools'* dated November 2015 (revised August 2017).

5. Field Work Methods

After underground services searches and location in the field, each borehole location was marked and surveyed using a high precision differential global positioning system (DGPS). The borehole locations and ground surface levels are recorded on the borehole logs and shown on Drawing 1, attached.

The field investigation included three boreholes (Enclosed Learning Areas: BH 1 and 5, Administration: BH 9) drilled with a tracked auger/rotary drilling rig. The boreholes were initially drilled using 110 mm diameter continuous spiral flight augers to refusal depths of 2.0 – 3. m. Core drilling at the three locations was then carried out using NMLC (50 mm diameter core) diamond drilling equipment for a penetration of 3.1 - 4.5 m into the rock.

A further six boreholes (Enclosed Learning Areas: BH 2, 3, 4, 6 and 8, Administration: BH 10) were drilled using a mini excavator fitted with a 150 mm diameter auger. At the administration building, one borehole, BH 2 was drilled using a hand auger to a depth of 0.25 m.

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[2] Auburn North Public School website: http://www.auburnnth-p.schools.nsw.edu.au/our-school/history-of-anps. Viewed 28 August 2017.

[3] Auburn North Public School (1073) Asbestos Register, reviewed 8 July May 2015, https://education.nsw.gov.au/media/asset-management/asbestos/site-ar/a1073ar.pdf. Viewed 31 July 2017

The collection of soil samples for contamination purposes was undertaken to take advantage of the geotechnical boreholes already drilled and subsequently to provide preliminary information on likely waste classification of the soils and an indication if widespread contamination is present in the investigation areas. *Ipso facto* it also provided information on the suitability of the investigation areas continued use as a school. The collected samples were recorded on DP's borehole logs with essential information included in the chain-of-custody sheets. The general sampling procedure adopted for the collection of environmental samples is summarised below:

- Collection of disturbed soil samples (at the near surface, regular intervals, changes in strata and signs of contamination) directly from the auger whilst wearing disposable gloves.
- Transfer of samples into laboratory-prepared glass jars, filled to the top to minimise the headspace within the sample jar and capping immediately to minimise loss of volatiles;
- Labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- Placement of the glass jars, with Teflon lined lid, into an ice cooled, insulated and sealed container for transport to the laboratory.

Note: The NSW EPA *Sampling Design Guidelines 1995* (EPA 1995) recommends a minimum of five samples locations for an investigation area of 500 m^2 area and a minimum of six sample locations for an investigation area of 1,000 m^2. Based on the 20 m by 10 m maximum plan dimensions for the proposed administration building (area of 200 m^2), the sampling of two boreholes (BH 9 and 10) was considered appropriate for this assessment. Moreover, based on the 50 m by 20 m in maximum plan dimensions for the new two level enclosed learning area building (area of 1,000 m^2), the sampling of seven boreholes (BH1-6 and 8) was considered appropriate for this assessment.

6. Assessment Criteria

6.1 Site Suitability

The laboratory results have been compared to heath investigation levels, health screening levels and maintenance levels for primary schools (Residential A criteria) as set out in Schedule B1 of the National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (amended 2013). These screening levels are summarised in Table A1, attached. Moreover, as an initial screen, any recorded detection of asbestos would be considered an exceedance of the site suitability criteria for the purpose of this contamination assessment.

Additionally, as the objective of this assessment is to review the risk of contamination with respect to site users and the continued use of the investigations areas as a school, and given that these areas will be covered in hardstands (concrete slabs), assessment of ecological criteria was not within the purview of this report.

6.2 Preliminary Waste Classification

To assess the waste classification of the material for off-site disposal purposes a preliminary waste classification assessment was undertaken in accordance with the six step process outlined in the NSW EPA *Waste Classification Guidelines 2014*. The soil results are assessed against the general solid waste criteria outlined in Tables 1 and 2 of the guidelines and which are shown in Table A1.

With respect to the natural materials at the site, these were also assessed for their potential classification as Virgin Excavated Natural Material (VENM). For the purpose of providing a screening criteria to compare laboratory results against for assessing VENM, DP have compared the results of the natural soils to published background concentrations in ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Environmental Soil Quality Guidelines* Background A [ANZECC A]. In the case of organics where no reference values exist the laboratory reporting limit (LRL) has been adopted as the screening level.

7. Field Results

The observations of the boreholes are given in detail in the borehole logs attached, together with notes defining classification methods and descriptive terms.

The boreholes for both buildings encountered variable subsurface conditions.

For the administration building, in BH 10, a natural soil profile was encountered with topsoil to 0.4 m depth than very stiff to hard clay to 1.0 m depth overlying extremely low strength shale. The borehole refused on very low strength shale at a depth of 1.3 m. In the cored BH 9, bitumen chip seal and concrete was encountered to 0.15 m depth overlying hard silty clay to a depth of 1.2 m then extremely weathered shale to a depth of 2.0 m.

At the enclosed learning area building (BH 1-6, and 8) the subsurface conditions comprised:

TOPSOIL/TOPSOIL FILLING:	In all boreholes except BH 1 and 8 (which were covered with asphalt), typically organic rich clay silt/silty clay or sand topsoil and topsoil filling to depths of 0.1 – 0.4 m; overlying
FILLING:	In all boreholes except BH 2 and 3. Variable, generally sandy or silty clay to depths of 0.4 - >2.0. BH 6 terminated in filling at 2 m depth and was observed to contain glass fragments;
SILTY CLAY:	In all boreholes except BH 3, 4 and 6. Variable consistency (stiff to hard), generally low to medium plasticity silty clay to depths of 0.9 m to > 1.9 m; then
BEDROCK:	In all boreholes except BH6, initially extremely low strength shale to excavator borehole termination depths of 0.3 - 1.5 m. In BH 1, becoming medium strength at 2.0 m depth then very low strength laminite at 3.2 m depth, then very low to low strength shale to termination at 6.2 m depth. In BH 5 becoming very low to medium strength laminite at 3.2 m depth , then low strength laminite to termination depth of 6.1 m.

No signs of gross chemical contamination, such as odours or staining, were observed during sampling.

No free groundwater was observed in any of the boreholes whilst augering. The use of water for rotary coring and the backfilling of the boreholes immediately on completion of drilling, precluding monitoring of the water levels in the longer term. Groundwater levels are variable and will change with rainfall, watering of grounds and alterations to drainage.

8. Laboratory Results

Ten selected samples collected for contamination purposes were subject to laboratory analysis. Samples were analysed for a combination of the following common contaminants: heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); benzene, toluene, ethylbenzene and xylene (BTEX); total recoverable hydrocarbons (TRH); polycyclic aromatic hydrocarbons (PAH); organochlorine pesticides (OCP); organophosphorus pesticides (OPP); polychlorinated biphenyls (PCB); phenols and asbestos. A summary of the laboratory results are presented in Table A1: Summary of Contamination Laboratory Results. This table along with the laboratory certificates and chain-of-custody documentation are attached.

The laboratory results recorded generally low concentrations of contaminates with all results for cadmium, mercury, BTEX, short chain TRH (C_6-C_{10}), OCP, OPP and PCB below the LRL. Where medium and long chain TRH was recorded above the LRL, these were at low concentrations with a maximum concentration of 790 mg/kg recorded in sample BH6/0.5.

Site Suitability

With the exception of BH10/0.1 which recorded a benzo(a)pyrene TEQ concentration of 4.2 mg/kg compared to the criteria of 3 mg/kg, all chemical laboratory results were below the adopted NEPC (2013) site suitability criteria.

With respect to the asbestos analysis, no samples recorded concentrations above the LRL of 0.1 g/kg. However, laboratory notes on sample BH6/0.5 indicated the presence of chrysotile asbestos in matted material during the laboratory analysis. For the purpose of this contamination review, detection of asbestos is considered an exceedance of the site suitability criteria.

Preliminary Waste Classification

PAH was detected in most samples with the highest benzo(a)pyrene and total PAH concentrations of 2.8 mg/kg and 38 mg/kg respectively. These were recorded in sample BH10/0.1, with the benzo(a)pyrene concentration the only result above the criteria for general solid waste without TCLP.[4] This sample was therefore subject to TCLP analysis, with concentrations of B(a) P below the general solid waste criteria.

[4] Total characteristic leaching procedure

All concentrations for arsenic, chromium and mercury were below the criteria for general solid waste without TCLP. Sample BH8/0.1 recorded the only concentration above this criteria for nickel with a concentration of 79 mg/kg, whilst sample BH10/0.1 recorded the only lead exceedance with a concentration of 260 mg/kg.

The TCLP analysis for PAH, nickel and lead on the respective samples mentioned above all recorded low leaching characteristics and were within the criteria for general solid waste with TCLP.

Regarding the detection of asbestos in sample BH6/0.5, the presence of any asbestos is considered an exceedance of the general solid waste criteria.

9. Discussion and Conclusions

9.1 Site Suitability

Given the extended period that the site has been used as a school (i.e. over 125 years), no groundwater was observed during soil sampling and the field and laboratory results, the main sources of potential contamination in the investigation areas are considered to be associated with:

- The importation of uncontrolled fill; and
- The presence of hazardous materials in the soils, most notably asbestos and lead paint, due to deterioration of existing structures or inappropriate demolition, handling and removal practices for previous structures on the school site.

As the majority of the samples recorded low contaminant levels and given the low leachability results for lead and benzo(a)pyrene from sample BH10/0.1, there appears a low risk of wide spread chemical contamination within the investigation areas. Moreover, given the low volatile nature of benzo(a)pyrene, the only exceeding analyte and then only in one sample (BH10/0.1), it is considered that risk from chemical contamination is primarily associated with direct contact between the subject soils and site users. This potential source-pathway-receptor linkage would be addressed by the construction of the new hardstands (concrete slabs) across the investigation areas, as proposed by the development.

With respect to the detection of chrysotile asbestos in sample BH6/0.5, this sample was collected from the filling where traces of broken glass were observed during the field work. The presence of asbestos in this sample indicates the potential for asbestos to be present in other filling across the investigation areas. The detection of asbestos is not uncommon given the nature of (past and present) buildings structures and the use of uncontrolled fill (as noted above). Based on the asbestos results, DP recommends the development of an asbestos management plan (AMP) to manage risk to workers and schools users prior to and during site works. The AMP should also include an unexpected finds protocol which sets out the process for managing materials encountered that may be of concern (e.g. odorous soils) and take into account any existing management plans for the school.

To address the detected asbestos in BH6 with respect to site suitability in the longer term, this would require further detailed assessment to determine if the asbestos concentrations at the site were within the allowable concentrations for a school landuse. Alternatively, to avoid such a detailed assessment it could be assumed that the concentrations are in excess of suitable levels and move straight to a "mitigate and manage" approach. Mitigation would be achieved via a marker layer and construction of the proposed concrete slabs, thereby forming a barrier between site users and the impacted soils within the investigation areas. This would need to be supplemented by a site specific asbestos management plan to appropriately manage these soils and barriers in the longer term, as is already implemented for numerous school sites across NSW.[5]

In summary, based on the information presented in this contamination assessment, the proposed development, no change in landuse is proposed and subject to implementation of the above recommended mitigation and management measures, it is considered the investigation areas will be suitable for their continued use as a school on completion of the construction.

It should be noted, however, that any surplus soils generated from the proposed development, if proposed to be retained within the school grounds outside of the proposed development footprints, will require further delineation and/or investigation in terms of suitability for re-use.

9.2 Preliminary Waste Classification

Based on the initial laboratory (total concentration) results, the subsequent TCLP analysis and given the detection of asbestos in BH6, the brown (silty clay, clayey silt and silt) topsoil and the red, orange, brown and grey silty clay, sandy clay and silty gravel filling are preliminary classified as **General Solid Waste (non-putrescible) Special Waste (asbestos)**.

Sample BH9/0.5 from the natural silty clays recorded results within background ranges. Given this and the generally low chemical contamination in the over lying filling, the natural grey, brown and red silty clays and the underlying shale and laminite bedrock have a preliminary classification of **VENM**.

Prior to off-site disposal the soils are to be inspected (and sampled if considered necessary) by an appropriately qualified Environmental Consultant to confirm the above classifications. Moreover, if during construction materials not outlined herein or displaying signs of environmental concern (e.g. asbestos, odours, staining) are encountered, these are to be segregated, stockpiled and reassessed prior to off-site disposal.

[5] Given that bulk excavation is not proposed for the development and the cost of soil disposal to landfill, a dig and dump remediation approach is unlikely to be a suitable.

10. Limitations

Douglas Partners (DP) has prepared this report for this project at Auburn North Public School as a variation to DP's proposal SYD170171 Rev1 dated 8 June 2018 and acceptance received from Ms Joelle Sarkis of Conrad Cargett Pty Ltd dated 26 June 2017. The work was carried out as a variation to the Architect and Sub-consultants agreement dated 12 July 2017. This report is provided for the exclusive use of Conrad Cargett Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current

scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the geotechnical components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Please contact the undersigned if you have any questions on this matter.

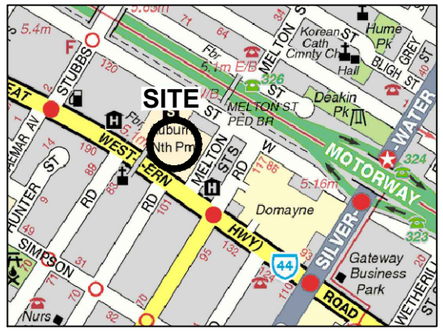
Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

David Holden
Environmental Scientist

Paul Gorman
Principal

Attachments:
Drawing 1- Test Location Plan
Drawing 2- 1943 Aerial Photograph
Borehole Logs and Notes About this Report
Table A1: Summary of Contamination Laboratory Results
Laboratory Certificate and Chain-of-Custody Documentation



Locality Plan

LEGEND

- Cored Boreholes
- Augered Boreholes (with DCP)
- Dynamic Cone Penetrometer Test (DCP)
- Outline of new building footprint

NOTE:
1: Base drawing from Conrad Gargett Pty Ltd Drawing AN-01-SD-AR-DR-A1000 (undated)
2: Test locations are approximate only and are shown with reference to existing site features.

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Conrad Gargett Pty Ltd	TITLE: **Test Location Plan** **Auburn North Public School** **100 Adderley Street, AUBURN**	PROJECT No: 86029.00
	OFFICE: Sydney / DRAWN BY: Vojta		DRAWING No: 1
	SCALE: 1:1000@A3 / DATE: 14.7.2017		REVISION: 0

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Conrad Gargett Pty Ltd		TITLE:	**1943 Aerial Photograph** **Auburn North Public School** **100 Adderley Street, Auburn**	PROJECT No:	86029.00
	OFFICE:	Sydney	DRAWN BY: DIH			DRAWING No:	2
	SCALE:	As shown	DATE: 28.08.2017			REVISION:	0

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approximate Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

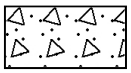
Symbols & Abbreviations

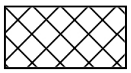
Graphic Symbols for Soil and Rock

General

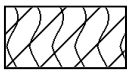

Asphalt

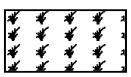

Road base

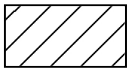

Concrete

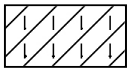

Filling

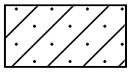
Soils


Topsoil

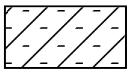

Peat

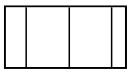

Clay

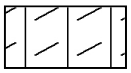

Silty clay

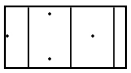

Sandy clay

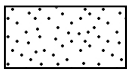

Gravelly clay

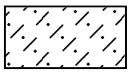

Shaly clay

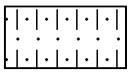

Silt


Clayey silt


Sandy silt

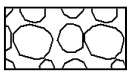

Sand

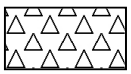

Clayey sand


Silty sand


Gravel

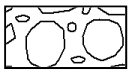

Sandy gravel


Cobbles, boulders

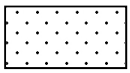

Talus

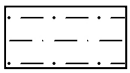
Sedimentary Rocks

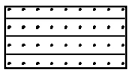

Boulder conglomerate

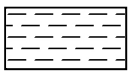

Conglomerate


Conglomeratic sandstone

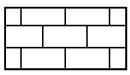

Sandstone


Siltstone

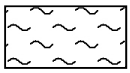

Laminite

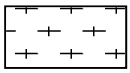

Mudstone, claystone, shale

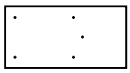

Coal


Limestone

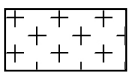
Metamorphic Rocks

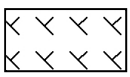

Slate, phyllite, schist

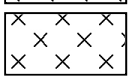

Gneiss

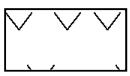

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 24.5 AHD
EASTING: 318546.3
NORTHING: 6253678.6
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing			
			EW HW MW SW FS FR		Ex Low / Very Low / Low / Medium / High / Very High / Ex High		0.01 / 0.05 / 0.10 / 0.50 / 1.00	B - Bedding J - Joint S - Shear F - Fault	Type	Core Rec. %	RQD %	Test Results & Comments
	0.05	ASPHALTIC CONCRETE							A/E			
	0.2	FILLING - dark grey fine to coarse silty gravel filling with some fine sand, humid							A/E			
24	0.5	FILLING - brown and red-brown silty clay filling with some fine angular gravel, humid							A/E			
		SILTY CLAY - stiff, red-brown silty clay, apparently low plasticity, humid							A			
	1								S			7,6,7 N = 13
23	1.6	SHALE - extremely low strength, extremely weathered, light brown and grey shale, humid						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°				
	2								A			
	2.0	SHALE - medium to high strength, highly weathered, slightly fractured, light grey and red-brown shale						2.25m: J70°, un, ro, cln				PL(A) = 1.68
22	3											
	3.2	LAMINITE - low strength, highly weathered, slightly fractured, light grey and brown laminite										PL(A) = 0.17
21									C	100	85	
								3.8m: J60°, pl, sm, cly				
	4							4m: J, sv, he/ti				
								4.16, 4.30, 4.50, 4.58m: J (x4) 75°, pl, sm, cln/ti				
20												PL(A) = 0.32
	4.85	SHALE - see next page						4.82m: J60°, pl, ro, fe 4.83-5.05m: fg				

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM/SI **CASING:** HW to 2.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 2.0m; NMLC-Coring to 6.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 24.5 AHD
EASTING: 318546.3
NORTHING: 6253678.6
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 86029
DATE: 7/7/2017
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
19	6	SHALE - very low strength, highly weathered, slightly fractured, light grey and brown shale with low strength bands *(continued)*						5.05m: J65°, pl, ro, ti 5.17m: J, sv, ti 5.37-5.7m: Ds 5.87-6.25m: Ds	C	100	0	PL(A) = 3.09
	6.2	Bore discontinued at 6.2m										
18	7											
17	8											
16	9											
15												

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM/SI **CASING:** HW to 2.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 2.0m; NMLC-Coring to 6.2m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

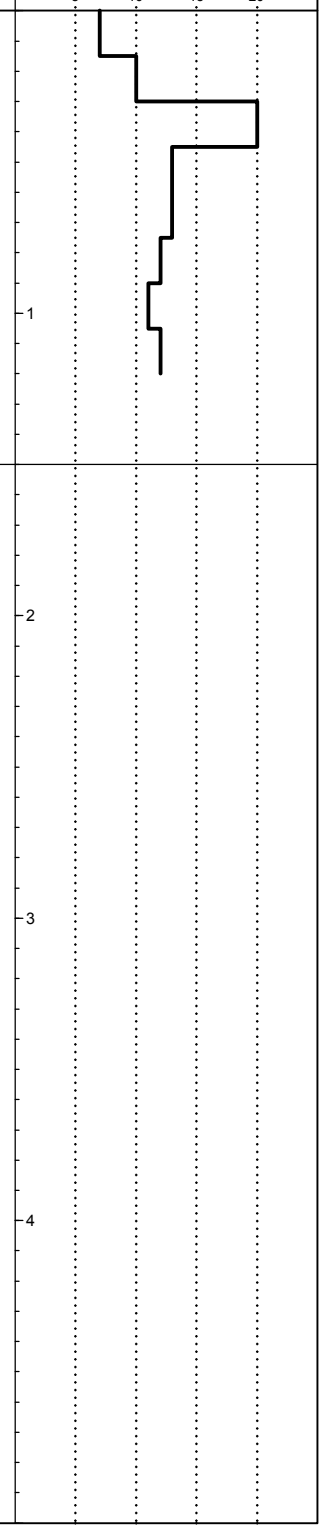
BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 23.4 AHD
EASTING: 318568.5
NORTHING: 6253682.6
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
23	0.0	TOPSOIL - brown silt topsoil filling with some fine to medium gravel, rootlets and a trace of fine sand, humid		A/E	0.1				
				A/E	0.3				
	0.4	SILTY CLAY - hard, red-brown silty clay with some fine ironstone gravel, apparently low to medium plasticity, humid							
		- possible ironstone band at 0.8m							
	1	- becoming mottled grey at 1.0m		A	1.0				
22	1.4								
	1.5	SHALE - extremely low strength, extremely weathered, red and grey shale with some clay seams and ironstone bands		A	1.5				
		Bore discontinued at 1.5m - refusal on possible very low strength shale or ironstone band							
21	2								
20	3								
19	4								



RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 1.5m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 21.7 AHD
EASTING: 318560
NORTHING: 6253667.8
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
21	0.05	TOPSOIL - dark brown silty clay topsoil filling with some fine gravel, damp		A/E	0.1				5 10 15 20
				A	0.2				
	0.3	SHALE - extremely low strength, extremely weathered, red and grey shale, humid							
		Bore discontinued at 0.3m - refusal on possible very low strength shale							
20	1								1
	2								2
19	3								3
18	4								4
17									

RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 0.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Auger grinding at 0.2m. Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 20.9 AHD
EASTING: 318548.6
NORTHING: 6253649.1
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
20	0.2	TOPSOIL - dark brown silty clay topsoil filling with some fine to medium gravel, rootlets and traces of fine sand, damp		A/E	0.1				
	0.4	FILLING - orange-brown and brown sandy clay filling with some fine to medium angular gravel, generally in a stiff condition, humid		A/E	0.3				
19		SHALE - extremely low strength, extremely weathered, brown and grey shale, humid		A/E	0.5				
	0.8	Bore discontinued at 0.8m - refusal on possible very low strength shale		A	0.8				
18									
17									
16									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: 150mm diameter solid flight auger to 0.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Auger grinding at 0.6m. Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 20.8 AHD
EASTING: 318539.5
NORTHING: 6253634.5
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
20	0.2	TOPSOIL - dark brown clayey silt topsoil filling with some fine to medium sand, damp							A/E			
		FILLING - red-brown and brown mottled dark grey, grey and orange-brown, silty clay filling with some fine to medium gravel, damp							A/E			
									A/E			
1									A/E			
	1.2	SILTY CLAY - stiff, brown and grey silty clay with some rootlets and ironstone bands, apparently medium plasticity							S			3,3,5 N = 8
19									A			
	1.9	SHALE - extremely low strength, extremely weathered, brown and grey shale, humid										
2									A			
		- becoming grey at 2.5m						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	A			
18									S			7,13,27 N = 40
	3.0	LAMINITE - extremely low and very low strength, extremely to highly weathered, fragmented to fractured, grey-brown laminite with medium strength iron-cemented bands						3.22-3.35m: fg, fe, cly 3.4-3.43m: fg 3.52-3.55m: Cs				PL(A) = 0.14
3												
17								3.8-3.85m: B0°, fe				
4								3.95-4.0m: Ds 4.1-4.15m: fg, fe 4.22-4.25m: Cs 4.35-4.37m: Cs	C	100	52	
	4.35	LAMINITE - low strength, slightly weathered, slightly fractured, light grey to grey laminite with approximately 40% fine sandstone laminations						4.65-4.72m: Cs				PL(A) = 0.21
16												

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM **CASING:** HW to 3.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 3.0m; NMLC-Coring to 6.05m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 20.8 AHD
EASTING: 318539.5
NORTHING: 6253634.5
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 86029
DATE: 7/7/2017
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
15	6	LAMINITE - low strength, slightly weathered, slightly fractured, light grey to grey laminite with approximately 40% fine sandstone laminations *(continued)*						5.55m: B5°, cly co, 2mm	C	100	52	PL(A) = 0.23
	6.05	Bore discontinued at 6.05m										
14	7											
13	8											
12	9											
11												

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM **CASING:** HW to 3.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 3.0m; NMLC-Coring to 6.05m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 23.2 AHD
EASTING: 318535.9
NORTHING: 6253654.9
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
23	0.3	TOPSOIL - dark brown silt topsoil filling with some twigs and rootlets, slightly sandy, fine to medium, generally in a firm condition		A/E	0.1				
		FILLING - red-brown and brown silty clay filling with some fine to medium gravel and traces of broken glass, generally in a firm condition, damp		A/E	0.3		0.3-0.6m: Bulk sample		
	0.7			A/E	0.5				
		FILLING - dark brown silty clay with some fine angular gravel, generally in a soft to firm condition, damp (possible buried topsoil)							
	1			A/E	1.0				1
22	1.1	FILLING - grey-brown to brown silty clay filling with some fine to medium angular gravel, generally in a stiff condition, damp							
				A/E	1.5				
	2								2
	2.0	Bore discontinued at 2.0m - target depth reached		A	2.0				
21									
	3								3
20									
	4								4
19									

RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 2.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 23.6 AHD
EASTING: 318536.3
NORTHING: 6253662.7
DIP/AZIMUTH: 90°/--

BORE No: BH8
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
23	0.04	ASPHALTIC CONCRETE		A/E	0.1				
	0.2	FILLING - dark grey fine to medium silty gravel filling with some fine sand, humid		A/E	0.3				
		FILLING - brown mottled red and grey silty clay filling with some fine to medium gravel and some fine sand, generally in a very stiff condition		A/E	0.5				
	0.7	SILTY CLAY - very stiff, brown to red-brown silty clay with some medium to coarse ironstone gravel, apparently low to medium plasticity, humid							
	0.9								
22	1.0	SHALE - extremely low strength, extremely weathered, red and grey shale with some ironstone bands, humid		A	1.0				
		Bore discontinued at 1.0m - refusal on possible very low strength shale or ironstone band							
21									
20									
19									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3, 4

RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 1.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 25.4 AHD
EASTING: 318540.3
NORTHING: 6253717.1
DIP/AZIMUTH: 90°/--

BORE No: BH9
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
25	0.05	BITUMEN SURFACE							A			
	0.15	REINFORCED CONCRETE										
		SILTY CLAY - hard, brown and red-brown silty clay with some fine ironstone gravel, apparently low plasticity, humid - becoming red mottled grey at 0.5m							A/E A/E			
24	1.15	SHALE - extremely low strength, extremely weathered, red and grey shale with some ironstaining, humid							S			11,18,24 N = 42
	1.8	SHALE - extremely low to very low strength, light brown and grey shale						Note: Unless otherwise stated, rock is fractured along rough planar bedding dipping 0°- 10°	A			
23	2.2	SHALE - low strength, highly weathered, fragmented then slightly fractured, light grey-brown shale						2m: CORE LOSS: 200mm 2.2-2.45m: fg				PL(A) = 0.17
22	3.2	SHALE - very low strength, highly weathered, slightly fractured, light grey and red-brown shale with medium strength iron-cemented bands						3.3m: J50°, pl, ro, ti 3.4-3.55m: Ds 3.75m: J70°, un, ro, cly 4.2m: B0°, fe, cly, 10mm 4.4-4.6m: J (x5) 45°-60°, cu, ro, fe 4.9m: J50°, pl, ro, fe	C	94	30	PL(A) = 0.13 PL(A) = 0.12
21	4.6								C	100	0	

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM **CASING:** HW to 2.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 2.0m; NMLC-Coring to 6.7m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 25.4 AHD
EASTING: 318540.3
NORTHING: 6253717.1
DIP/AZIMUTH: 90°/--

BORE No: BH9
PROJECT No: 86029
DATE: 7/7/2017
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
20	6	SHALE - very low strength, highly weathered, slightly fractured, light grey and red-brown shale with medium strength iron-cemented bands *(continued)*						5.15m: J60°, pl, ro, fe 5.4-5.65m: Ds 5.7m: J45°- 70°, st, sm, fe 5.92-6.7m: Ds	C	100	0	PL(A) = 0.61 PL(A) = 0.1
19	6.7	Bore discontinued at 6.7m										
18	7											
17	8											
16	9											

RIG: Han-Jin D8 **DRILLER:** BG Drilling **LOGGED:** RMM **CASING:** HW to 2.0m

TYPE OF BORING: Solid flight auger (TC-bit) to 2.0m; NMLC-Coring to 6.7m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
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BOREHOLE LOG

CLIENT: Conrad Gargett Pty Ltd
PROJECT: DoEAMD-16-78 Group 2 - Parramatta
LOCATION: Auburn North Public School, 100 Adderley Street, Auburn

SURFACE LEVEL: 25.5 AHD
EASTING: 318540.2
NORTHING: 6253705.3
DIP/AZIMUTH: 90°/--

BORE No: BH10
PROJECT No: 86029
DATE: 7/7/2017
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
25	0.4	TOPSOIL - brown slightly clayey silt topsoil filling with some fine sand and fine to coarse gravel, humid - becoming silty clay at 0.2m		A/E A/E	0.1 0.3				
		SILTY CLAY - very stiff to hard, red-brown silty clay, apparently low plasticity, humid		A	0.5				
24	1.0	SHALE - extremely low strength, extremely weathered, red and grey shale with some ironstone bands, humid		A	1.0				
	1.3	Bore discontinued at 1.3m - refusal on possible low strength shale or ironstone band		A	1.3				
23									
22									
21									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: Kubota U35-3 **DRILLER:** BM **LOGGED:** RMM **CASING:** Uncased

TYPE OF BORING: Solid flight auger (TC-bit) to 1.3m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Metal pipe encountered at 0.3m running towards street. Hole relocated approximately 0.2m west. Survey levels interpolated from Craig & Rhodes Pty Ltd drawing 050-17G T01 dated 28/6/2017

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Table A1: Summary of Contamination Laboratory Results

				BTEX							Metals									OCP							OPP		PAH								TRH									
				Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Lead- TCLP	Mercury	Nickel	Nickel- TCLP	Zinc	OCP (Sum of total)	Aldrin + Dieldrin	DDT+DDE+DDD	Endrin	Heptachlor	Methoxychlor	OPP (sum of total)	Chlorpyrifos	Benzo(a) pyrene	Benzo(a)pyrene- TCLP	B(a)P Total Potency Equivalent	Naphthalene	PAHs (Sum of total)	Phenolics Total	PCB (Sum of total)	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	>C10 -C40(Sum of total +ve)	C6-C10	Asbestos
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g/kg
EQL				0.2	1	0.5	2	1	1	25	4	0.4	1	1	1	0.03	0.1	1	0.02	1	2	0.2	0.1	0.1	0.1	0.1	1.2	0.1	0.05	0.001	0.5	0.1	0.05	5	0.8	50	100	100	50	25	50	100	100	50	25	0.1
NEPM 2013 HILs/HSLs Res A Soil				100	4500	14,000			12,000	4400	100	20	100	6000	300		40	400		7400		6	240	10	6	300		160			3	1400	300	100	1		4500	6300	3300							
NEPM 2013 Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m				0.5	55	160			40	45																					3							110							
NEPM 2013 Management Limits in Res / Parkland, Coarse Soil																																			1000	2500	10,000							700	
NSW 2014 General Solid Waste (CT1)				10	600	288			1000		100	20	100		100		4	40			50						50	4	0.8				200		50					650				10,000		NAD
NSW 2014 General Solid Waste (SCC1 and TCLP1)				18	1080	518			1800		500	100	1900		1500	5	50	1050	2		50						50	7.5	10	0.04			200		50					650				10,000		NAD
ANZECC (1992) - For Natural Material				0.05-1		0.1-1					0.2-30	0.04-2	0.5-110	1-190	<2-200		0.001-0.1	2-400		2-180												0.95-5	0.03-0.5												
Location	**Sample Depth**	**Sample Date**	**Srtata**																																											
BH2	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<1	<25	12	<0.4	21	18	75	-	0.1	4	-	70	-	-	-	-	-	-	-	-	0.2	-	<0.5	<0.1	2	-	-	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	<0.1
BH3	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	4	<0.4	7	5	8	-	<0.1	2	-	8	-	-	-	-	-	-	-	-	<0.05	-	<0.5	<0.1	<0.05	-	-	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	-
BH4	0.3	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	11	<0.4	23	21	61	-	0.1	4	-	130	-	-	-	-	-	-	-	-	0.1	-	<0.5	<0.1	1.4	-	-	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	<0.1
BH5	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	4	<0.4	14	25	29	-	<0.1	9	-	84	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<1.2	<0.1	0.06	-	<0.5	<0.1	0.3	<5	<0.8	<50	130	<100	<50	<25	<50	<100	140	130	<25	<0.1
BH5	0.5	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	7	<0.4	23	29	24	-	<0.1	20	-	110	-	-	-	-	-	-	-	-	0.2	-	0.6	<0.1	3.7	-	-	<50	150	<100	<50	<25	<50	100	<100	150	<25	<0.1
BH6	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	5	<0.4	15	43	74	-	<0.1	9	-	220	<2	<0.2	<0.1	<0.1	<0.1	<0.1	<1.2	<0.1	0.08	-	<0.5	<0.1	0.4	<5	<0.8	<50	330	160	<50	<25	<50	150	260	490	<25	<0.1
BH6	0.5	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	9	<0.4	25	15	42	-	<0.1	5	-	100	-	-	-	-	-	-	-	-	0.1	-	<0.5	<0.1	0.59	-	-	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	**AD**
BH8	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	<4	<0.4	90	32	5	-	<0.1	79	<0.02	47	-	-	-	-	-	-	-	-	<0.05	-	<0.5	0.1	0.4	-	-	<50	460	330	<50	<25	<50	140	460	790	<25	<0.1
BH9	0.5	7/07/2017	Natural	<0.2	<1	<0.5	<2	<1	<3	<25	6	<0.4	25	1	9	-	<0.1	1	-	2	-	-	-	-	-	-	-	-	<0.05	-	<0.5	<0.1	<0.05	-	-	<50	<100	<100	<50	<25	<50	<100	<100	<50	<25	-
BH10	0.1	7/07/2017	Filling	<0.2	<1	<0.5	<2	<1	<3	<25	8	<0.4	23	19	260	0.1	0.1	10	-	130	-	-	-	-	-	-	-	-	2.8	<0.001	**4.2**	<0.1	38	-	-	<50	330	110	<50	<25	<50	170	230	440	<25	<0.1

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CERTIFICATE OF ANALYSIS 171381

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: David Holden, Zoe Maher

Sample log in details:

Your Reference:	**86029.00, Auburn North**		
No. of samples:	8 soils		
Date samples received / completed instructions received	14/07/17	/	14/07/17

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	21/07/17	/	21/07/17
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	171381-1	171381-2	171381-3	171381-4	171381-5
Your Reference	---------- -	BH2	BH3	BH4	BH5	BH5
Depth	----------	0.1	0.1	0.3	0.1	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017	18/07/2017	18/07/2017
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	102	102	101	101	101

vTRH(C6-C10)/BTEXN in Soil				
Our Reference:	UNITS	171381-6	171381-7	171381-8
Your Reference	---------- -	BH8	BH9	BH10
Depth	----------	0.1	0.5	0.1
Type of sample		Soil	Soil	Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017
TRHC6 - C9	mg/kg	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	106	102	106

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	171381-1	171381-2	171381-3	171381-4	171381-5
Your Reference	----------	BH2	BH3	BH4	BH5	BH5
Depth	- ----------	0.1	0.1	0.3	0.1	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	140	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	130	150
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	130	150
Surrogate o-Terphenyl	%	87	97	96	90	92

svTRH (C10-C40) in Soil				
Our Reference:	UNITS	171381-6	171381-7	171381-8
Your Reference	----------	BH8	BH9	BH10
Depth	- ----------	0.1	0.5	0.1
Type of sample		Soil	Soil	Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	17/07/2017	17/07/2017	17/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	140	<100	170
TRHC$_{29}$ - C$_{36}$	mg/kg	460	<100	230
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	460	<100	330
TRH>C$_{34}$-C$_{40}$	mg/kg	330	<100	110
Total +ve TRH (>C10-C40)	mg/kg	790	<50	440
Surrogate o-Terphenyl	%	102	93	96

PAHs in Soil Our Reference: Your Reference Depth Type of sample	UNITS ---------- - ---------- 	171381-1 BH2 0.1 Soil	171381-2 BH3 0.1 Soil	171381-3 BH4 0.3 Soil	171381-4 BH5 0.1 Soil	171381-5 BH5 0.5 Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017	18/07/2017	18/07/2017
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	0.1	<0.1	0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.4	<0.1	0.3	0.1	0.5
Pyrene	mg/kg	0.4	<0.1	0.3	0.1	0.7
Benzo(a)anthracene	mg/kg	0.2	<0.1	0.1	<0.1	0.4
Chrysene	mg/kg	0.2	<0.1	0.1	<0.1	0.3
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	0.2	<0.2	0.7
Benzo(a)pyrene	mg/kg	0.2	<0.05	0.1	0.06	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.1	<0.1	0.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Total +ve PAH's	mg/kg	2.0	<0.05	1.4	0.3	3.7
Surrogate p-Terphenyl-d14	%	100	103	98	114	107

PAHs in Soil Our Reference: Your Reference Depth Type of sample	UNITS ---------- - ---------- 	171381-6 BH8 0.1 Soil	171381-7 BH9 0.5 Soil	171381-8 BH10 0.1 Soil
Date extracted	-	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017
Naphthalene	mg/kg	0.1	<0.1	0.1
Acenaphthylene	mg/kg	<0.1	<0.1	0.3
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	0.2
Phenanthrene	mg/kg	0.3	<0.1	4.6
Anthracene	mg/kg	<0.1	<0.1	1.2
Fluoranthene	mg/kg	<0.1	<0.1	7.2
Pyrene	mg/kg	<0.1	<0.1	6.6
Benzo(a)anthracene	mg/kg	<0.1	<0.1	3.5
Chrysene	mg/kg	<0.1	<0.1	2.5
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	4.9
Benzo(a)pyrene	mg/kg	<0.05	<0.05	2.8
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	1.5
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	0.4
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	1.7
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	4.2
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	4.2
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	4.2
Total +ve PAH's	mg/kg	0.4	<0.05	38
Surrogate p-Terphenyl-d14	%	113	112	104

Organochlorine Pesticides in soil		
Our Reference:	UNITS	171381-4
Your Reference	----------	BH5
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	17/07/2017
Date analysed	-	20/07/2017
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	90

Organophosphorus Pesticides		
Our Reference:	UNITS	171381-4
Your Reference	----------	BH5
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	17/07/2017
Date analysed	-	20/07/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	90

PCBs in Soil		
Our Reference:	UNITS	171381-4
Your Reference	----------	BH5
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	17/07/2017
Date analysed	-	20/07/2017
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	90

Acid Extractable metals in soil						
Our Reference:	UNITS	171381-1	171381-2	171381-3	171381-4	171381-5
Your Reference	----------	BH2	BH3	BH4	BH5	BH5
	-					
Depth	----------	0.1	0.1	0.3	0.1	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Arsenic	mg/kg	12	4	11	4	7
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	21	7	23	14	23
Copper	mg/kg	18	5	21	25	29
Lead	mg/kg	75	8	61	29	24
Mercury	mg/kg	0.1	<0.1	0.1	<0.1	<0.1
Nickel	mg/kg	4	2	4	9	20
Zinc	mg/kg	70	8	130	84	110

Acid Extractable metals in soil				
Our Reference:	UNITS	171381-6	171381-7	171381-8
Your Reference	----------	BH8	BH9	BH10
	-			
Depth	----------	0.1	0.5	0.1
Type of sample		Soil	Soil	Soil
Date prepared	-	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	17/07/2017	17/07/2017	17/07/2017
Arsenic	mg/kg	<4	6	8
Cadmium	mg/kg	<0.4	<0.4	<0.4
Chromium	mg/kg	90	25	23
Copper	mg/kg	32	1	19
Lead	mg/kg	5	9	260
Mercury	mg/kg	<0.1	<0.1	0.1
Nickel	mg/kg	79	1	10
Zinc	mg/kg	47	2	130

Misc Soil - Inorg		
Our Reference:	UNITS	171381-4
Your Reference	----------	BH5
	-	
Depth	----------	0.1
Type of sample		Soil
Date prepared	-	17/07/2017
Date analysed	-	17/07/2017
Total Phenolics (as Phenol)	mg/kg	<5

Moisture						
Our Reference:	UNITS	171381-1	171381-2	171381-3	171381-4	171381-5
Your Reference	---------- -	BH2	BH3	BH4	BH5	BH5
Depth	----------	0.1	0.1	0.3	0.1	0.5
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	17/07/2017	17/07/2017	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017	18/07/2017	18/07/2017
Moisture	%	13	18	18	18	17

Moisture				
Our Reference:	UNITS	171381-6	171381-7	171381-8
Your Reference	---------- -	BH8	BH9	BH10
Depth	----------	0.1	0.5	0.1
Type of sample		Soil	Soil	Soil
Date prepared	-	17/07/2017	17/07/2017	17/07/2017
Date analysed	-	18/07/2017	18/07/2017	18/07/2017
Moisture	%	5.8	17	7.6

Asbestos ID - soils						
Our Reference:	UNITS	171381-1	171381-3	171381-4	171381-5	171381-6
Your Reference	----------	BH2	BH4	BH5	BH5	BH8
	-					
Depth	----------	0.1	0.3	0.1	0.5	0.1
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	21/07/2017	21/07/2017	21/07/2017	21/07/2017	21/07/2017
Sample mass tested	g	Approx. 35g	Approx. 30g	Approx. 35g	Approx. 35g	Approx. 55g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils		
Our Reference:	UNITS	171381-8
Your Reference	----------	BH10
	-	
Depth	----------	0.1
Type of sample		Soil
Date analysed	-	21/07/2017
Sample mass tested	g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-7	18/07/2017
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-7	99%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-7	99%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-7	86%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-7	97%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-7	101%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-7	106%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-7	104%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	113	[NT]	[NT]	LCS-7	104%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-7	97%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-7	97%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-7	106%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-7	97%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-7	97%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-7	106%
Surrogate o-Terphenyl	%		Org-003	85	[NT]	[NT]	LCS-7	115%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-7	18/07/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	111%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	100%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	108%
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	109%
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	110%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-7	117%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	LCS-7	97%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	109	[NT]	[NT]	LCS-7	102%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			20/07/2017	[NT]	[NT]	LCS-7	20/07/2017
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	82%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	101%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	102%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	95%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	97%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	98%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	107%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	105%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	107%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-7	102%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	90	[NT]	[NT]	LCS-7	108%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			20/07/2017	[NT]	[NT]	LCS-7	20/07/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	89%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	85%
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	93%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	101%
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	94%
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	114%
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-7	97%
Surrogate TCMX	%		Org-008	90	[NT]	[NT]	LCS-7	96%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			20/07/2017	[NT]	[NT]	LCS-7	20/07/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-7	100%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	90	[NT]	[NT]	LCS-7	96%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	LCS-7	104%
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	LCS-7	102%
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-7	105%
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-7	103%
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-7	101%
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	LCS-7	106%
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-7	98%
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-7	99%
QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Date analysed	-			17/07/2017	[NT]	[NT]	LCS-7	17/07/2017
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	LCS-7	106%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.

Note: Samples 171381-1, 3 to 6, 8 were sub-sampled from jars provided by the client.

Asbestos ID was analysed by Approved Identifier:	Lucy Zhu
Asbestos ID was authorised by Approved Signatory:	Lulu Scott

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

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Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 171381-A

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: David Holden, Zoe Maher

Sample log in details:

Your Reference:	**86029.00, Auburn North**
No. of samples:	Additional Testing on 1 Soil
Date samples received / completed instructions received	14/07/17 / 20/07/17

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	27/07/17 / 24/07/17
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

Metals in TCLP USEPA1311		
Our Reference:	UNITS	171381-A-8
Your Reference	----------	BH10
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	20/07/2017
Date analysed	-	21/07/2017
pH of soil for fluid# determ.	pH units	8.8
pH of soil TCLP (after HCl)	pH units	1.2
Extraction fluid used	-	1
pH of final Leachate	pH units	4.9
Lead in TCLP	mg/L	0.1

PAHs in TCLP (USEPA 1311)		
Our Reference:	UNITS	171381-A-8
Your Reference	----------	BH10
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	21/07/2017
Date analysed	-	21/07/2017
Naphthalene in TCLP	mg/L	<0.001
Acenaphthylene in TCLP	mg/L	<0.001
Acenaphthene in TCLP	mg/L	<0.001
Fluorene in TCLP	mg/L	<0.001
Phenanthrene in TCLP	mg/L	<0.001
Anthracene in TCLP	mg/L	<0.001
Fluoranthene in TCLP	mg/L	<0.001
Pyrene in TCLP	mg/L	<0.001
Benzo(a)anthracene in TCLP	mg/L	<0.001
Chrysene in TCLP	mg/L	<0.001
Benzo(bjk)fluoranthene in TCLP	mg/L	<0.002
Benzo(a)pyrene in TCLP	mg/L	<0.001
Indeno(1,2,3-c,d)pyrene - TCLP	mg/L	<0.001
Dibenzo(a,h)anthracene in TCLP	mg/L	<0.001
Benzo(g,h,i)perylene in TCLP	mg/L	<0.001
Total +ve PAH's	mg/L	NIL (+)VE
Surrogate p-Terphenyl-d14	%	70

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP) using Zero Headspace Extraction (zHE) using AS4439 and USEPA 1311.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Org-012	Leachates are extracted with Dichloromethane and analysed by GC-MS.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			20/07/2017	[NT]	[NT]	LCS-W1	20/07/2017
Date analysed	-			21/07/2017	[NT]	[NT]	LCS-W1	21/07/2017
Lead in TCLP	mg/L	0.03	Metals-020 ICP-AES	<0.03	[NT]	[NT]	LCS-W1	96%
QUALITY CONTROL PAHs in TCLP (USEPA 1311)	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			21/07/2017	[NT]	[NT]	LCS-W1	21/07/2017
Date analysed	-			21/07/2017	[NT]	[NT]	LCS-W1	21/07/2017
Naphthalene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	96%
Acenaphthylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Acenaphthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Fluorene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	92%
Phenanthrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	106%
Anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Fluoranthene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	104%
Pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	104%
Benzo(a)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Chrysene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	114%
Benzo(bjk)fluoranthene in TCLP	mg/L	0.002	Org-012	<0.002	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	LCS-W1	122%
Indeno(1,2,3-c,d)pyrene -TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene in TCLP	mg/L	0.001	Org-012	<0.001	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	105	[NT]	[NT]	LCS-W1	107%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Aileen Hie

From: David Holden <David.Holden@douglaspartners.com.au>
Sent: Thursday, 20 July 2017 4:03 PM
To: Aileen Hie
Cc: Zoe Maher
Subject: RE: 171381 86029.00, Auburn North- Additional TCLP Analysis

Envirolab Ref. 171381A
Due: 27/7/17.
Std TIA.

Aileen,

Apologies, should be the other batch.

ELS job 171381-8 (BH10/0.1)- TCLP for PAH and lead

Thanks

David Holden | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0652 | F: 02 9809 4095 | M: 0414 768 997 | E: David.Holden@douglaspartners.com.au

From: Aileen Hie [mailto:AHie@envirolab.com.au]
Sent: Thursday, 20 July 2017 3:03 PM
To: David Holden
Cc: Zoe Maher
Subject: RE: 171477 86029.00, Auburn North- Additional TCLP Analysis

Hi Dave

There's only 2 samples in this batch. Is it from another batch?

Regards,

Aileen Hie | Sample Receipt Supervisor | Envirolab Services Pty Ltd

Great Science, Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200 **F** 612 9910 6201
E ahie@envirolab.com.au | **W** www.envirolab.com.au

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 171381-B

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: David Holden, Zoe Maher

Sample log in details:

Your Reference:	**86029.00, Auburn North**
No. of samples:	Additional Testing on 1 Soil
Date samples received / completed instructions received	14/07/17 / 31/07/17

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	1/08/17 / 1/08/17
Date of Preliminary Report:	Not Issued

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Results Approved By:

David Springer
General Manager

Metals in TCLP USEPA1311		
Our Reference:	UNITS	171381-B-8
Your Reference	----------	BH10
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	20/07/2017
Date analysed	-	21/07/2017
Nickel in TCLP	mg/L	<0.02

Method ID	Methodology Summary
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			20/07/2017	[NT]	[NT]	LCS-1	20/07/2017
Date analysed	-			21/07/2017	[NT]	[NT]	LCS-1	21/07/2017
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	[NT]	[NT]	LCS-1	101%

Report Comments:

Asbestos ID was analysed by Approved Identifier: Lucy Zhu
Asbestos ID was authorised by Approved Signatory: Lulu Scott

INS: Insufficient sample for this test
NR: Test not required
<: Less than
PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than
NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Aileen Hie

From: David Holden <David.Holden@douglaspartners.com.au>
Sent: Monday, 31 July 2017 5:12 PM
To: Aileen Hie
Subject: 171381-A 86029.00, Auburn North

Hi Aileen,

Could you please run TCLP analysis for nickel on sample 171381-A-8 (BH10/0.1)

It would be much appreciated if I could get this tomorrow (Tue 1/8/17).

Thanks

Dave

David Holden | Environmental Scientist
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
96 Hermitage Road West Ryde NSW 2114 | PO Box 472 West Ryde NSW 1685
P: 02 8878 0652 | F: 02 9809 4095 | M: 0414 768 997 | E: David.Holden@douglaspartners.com.au

Envirolab Ref: 171381B
Due: 1/8/17
1 day TAT.

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 171477

Client:
Douglas Partners Pty Ltd
96 Hermitage Rd
West Ryde
NSW 2114

Attention: David Holden, Zoe Maher

Sample log in details:

Your Reference:	**86029.00, Auburn North**		
No. of samples:	2 soils		
Date samples received / completed instructions received	14/07/17	/	17/07/17

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	24/07/17	/	21/07/17
Date of Preliminary Report:	Not Issued		

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Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date extracted	-	18/07/2017	18/07/2017
Date analysed	-	19/07/2017	19/07/2017
TRHC$_6$ - C$_9$	mg/kg	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
Total +ve Xylenes	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	112	111

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date extracted	-	18/07/2017	18/07/2017
Date analysed	-	19/07/2017	19/07/2017
$TRHC_{10}$ - C_{14}	mg/kg	<50	<50
$TRHC_{15}$ - C_{28}	mg/kg	150	<100
$TRHC_{29}$ - C_{36}	mg/kg	260	<100
$TRH>C_{10}$-C_{16}	mg/kg	<50	<50
$TRH>C_{10}$ - C_{16} less Naphthalene (F2)	mg/kg	<50	<50
$TRH>C_{16}$-C_{34}	mg/kg	330	<100
$TRH>C_{34}$-C_{40}	mg/kg	160	<100
Total +ve TRH (>C10-C40)	mg/kg	490	<50
Surrogate o-Terphenyl	%	104	89

PAHs in Soil			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date extracted	-	18/07/2017	18/07/2017
Date analysed	-	19/07/2017	19/07/2017
Naphthalene	mg/kg	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.1	0.2
Pyrene	mg/kg	0.1	0.2
Benzo(a)anthracene	mg/kg	<0.1	0.1
Chrysene	mg/kg	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.08	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5
Total +ve PAH's	mg/kg	0.4	0.59
Surrogate p-Terphenyl-d14	%	92	99

Organochlorine Pesticides in soil		
Our Reference:	UNITS	171477-1
Your Reference	----------	BH6
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	18/07/2017
Date analysed	-	18/07/2017
HCB	mg/kg	<0.1
alpha-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Surrogate TCMX	%	89

Organophosphorus Pesticides		
Our Reference:	UNITS	171477-1
Your Reference	----------	BH6
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	18/07/2017
Date analysed	-	18/07/2017
Azinphos-methyl (Guthion)	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Dichlorvos	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Ethion	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Surrogate TCMX	%	89

PCBs in Soil		
Our Reference:	UNITS	171477-1
Your Reference	----------	BH6
	-	
Depth	----------	0.1
Type of sample		Soil
Date extracted	-	18/07/2017
Date analysed	-	18/07/2017
Aroclor 1016	mg/kg	<0.1
Aroclor 1221	mg/kg	<0.1
Aroclor 1232	mg/kg	<0.1
Aroclor 1242	mg/kg	<0.1
Aroclor 1248	mg/kg	<0.1
Aroclor 1254	mg/kg	<0.1
Aroclor 1260	mg/kg	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1
Surrogate TCLMX	%	89

Acid Extractable metals in soil			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date prepared	-	18/07/2017	18/07/2017
Date analysed	-	18/07/2017	18/07/2017
Arsenic	mg/kg	5	9
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	15	25
Copper	mg/kg	43	15
Lead	mg/kg	74	42
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	9	5
Zinc	mg/kg	220	100

Misc Soil - Inorg		
Our Reference:	UNITS	171477-1
Your Reference	----------	BH6
	-	
Depth	----------	0.1
Type of sample		Soil
Date prepared	-	18/07/2017
Date analysed	-	18/07/2017
Total Phenolics (as Phenol)	mg/kg	<5

Moisture			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date prepared	-	18/07/2017	18/07/2017
Date analysed	-	19/07/2017	19/07/2017
Moisture	%	25	20

Asbestos ID - soils			
Our Reference:	UNITS	171477-1	171477-2
Your Reference	----------	BH6	BH6
	-		
Depth	----------	0.1	0.5
Type of sample		Soil	Soil
Date analysed	-	21/07/2017	21/07/2017
Sample mass tested	g	Approx. 30g	30.47g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-031	Total Phenolics by segmented flow analyser (in line distillation with colourimetric finish). Solids are extracted in a caustic media prior to analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			19/07/2017	[NT]	[NT]	LCS-2	19/07/2017
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-2	85%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-2	85%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-2	97%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-2	94%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	73%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-2	81%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	75%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	114	[NT]	[NT]	LCS-2	108%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			19/07/2017	[NT]	[NT]	LCS-2	19/07/2017
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-2	112%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	114%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	106%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-2	112%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	114%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	106%
Surrogate o-Terphenyl	%		Org-003	93	[NT]	[NT]	LCS-2	100%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			19/07/2017	[NT]	[NT]	LCS-2	19/07/2017
Naphthalene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	108%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	101%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	104%
Anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	112%
Pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	115%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	LCS-2	120%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012	<0.2	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	[NT]	[NT]	LCS-2	97%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	105	[NT]	[NT]	LCS-2	127%
QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
HCB	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	87%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	105%
Heptachlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	110%
delta-BHC	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	101%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	104%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	106%
Dieldrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	114%
Endrin	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	112%
pp-DDD	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	115%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	LCS-2	95%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCMX	%		Org-005	91	[NT]	[NT]	LCS-2	112%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	97%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	113%
Dimethoate	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	113%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	102%
Malathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	78%
Parathion	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	99%
Ronnel	mg/kg	0.1	Org-008	<0.1	[NT]	[NT]	LCS-2	107%
Surrogate TCMX	%		Org-008	91	[NT]	[NT]	LCS-2	93%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	LCS-2	100%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate TCLMX	%		Org-006	91	[NT]	[NT]	LCS-2	93%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Arsenic	mg/kg	4	Metals-020	<4	[NT]	[NT]	LCS-2	104%
Cadmium	mg/kg	0.4	Metals-020	<0.4	[NT]	[NT]	LCS-2	103%
Chromium	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-2	105%
Copper	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-2	103%
Lead	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-2	101%
Mercury	mg/kg	0.1	Metals-021	<0.1	[NT]	[NT]	LCS-2	106%
Nickel	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-2	99%
Zinc	mg/kg	1	Metals-020	<1	[NT]	[NT]	LCS-2	101%
QUALITY CONTROL Misc Soil - Inorg	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Date analysed	-			18/07/2017	[NT]	[NT]	LCS-2	18/07/2017
Total Phenolics (as Phenol)	mg/kg	5	Inorg-031	<5	[NT]	[NT]	LCS-2	103%

Report Comments:

Asbestos: A portion of the supplied sample was sub-sampled for asbestos analysis according to Envirolab procedures. We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g of sample in its own container.
Note: Samples 171477-1, 2 were sub-sampled from jars provided by the client.

Sample 171477-2; Chrysotile asbestos identified in matted material, however it is estimated less than the reporting limit for the method (i.e. < 0.1g/kg).

Asbestos ID was analysed by Approved Identifier: Lucy Zhu
Asbestos ID was authorised by Approved Signatory: Lulu Scott

INS: Insufficient sample for this test
NR: Test not required
<: Less than
PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than
NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.